

**WHAT IS CLAIMED IS:**

1. A jet propulsion watercraft comprising:
  - (A) a hull;
  - (B) a propulsion unit, comprising:
    - an internal combustion engine within said hull;
    - a manual throttle control for controlling a throttle of said internal combustion engine;
    - a jet propulsion water pump driven by said internal combustion engine, said jet propulsion water pump having a body, a water inlet for admitting water into said body, a water outlet at the opposite end of said body, an impeller for circulating water longitudinally through said body;
  - (C) a manual steering control for steering said jet propulsion watercraft;
  - (D) a steering nozzle coupled to said body in registry with said water outlet, said steering nozzle capable of being pivoted for controlling the direction of the jet of water produced by said propulsion unit and thereby steering said jet propulsion watercraft; and
  - (E) a throttle actuator responsive to said manual steering control for causing said propulsion unit to generate a propulsion force at least equal to the minimum propulsive force necessary to effectively steer said jet propulsion watercraft when said manual steering control is turned in either direction beyond a predetermined angular threshold, whereby to cause said jet propulsion watercraft to remain maneuverable independently of the manual throttle control setting.
2. A jet propulsion watercraft as defined in claim 1 wherein said throttle actuator is capable of controlling the speed of said engine.

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3. A jet propulsion watercraft as defined in claim 2 wherein said throttle actuator is capable of controlling said throttle.
4. A jet propulsion watercraft as defined in claim 3 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.
5. A jet propulsion watercraft as defined in claim 4 wherein said throttle actuator comprises a lost-motion mechanism whereby said throttle is actuated only when said manual steering control is turned beyond a predetermined angular threshold.
6. A jet propulsion watercraft as defined in claim 5 wherein said manual steering control is mounted to a steering assembly, said steering assembly having a bracket for retaining said cable.
7. A jet propulsion watercraft as defined in claim 6 wherein said steering assembly comprises mated gears for converting the rotation of said manual steering control into a rotation of said bracket.
8. A jet propulsion watercraft as defined in claim 7 further comprising a cable-receiving member fixed to said bracket, said cable-receiving member having a bore through which said cable can translate.

9. A jet propulsion watercraft as defined in claim 8 wherein said cable has an end-stopper of greater diameter than the diameter of said bore so that when said manual steering control is turned to the threshold, the end-stopper engages said cable-receiving member, whereby further rotation of the manual steering control causes said cable to be displaced, thereby opening said throttle.
10. A jet propulsion watercraft as defined in claim 9 wherein said cable-receiving member is mounted eccentrically with respect to a vertical pivot axis of said bracket whereby rotation in either direction results in displacement of the cable-receiving member.
11. A jet propulsion watercraft as defined in claim 10 wherein said watercraft is a single-engine personal watercraft.
12. A jet propulsion watercraft as defined in claim 10 wherein said watercraft is a twin-engine jet boat having two propulsion units and two steering nozzles coupled together for steering said jet propulsion watercraft.
13. A jet propulsion watercraft as defined in claim 12 wherein said throttle actuator has two cables.
14. A jet propulsion watercraft as defined in claim 13 wherein said throttle actuator has two cable-receiving members symmetrically fixed to said bracket whereby rotation of said bracket in one direction causes only one cable to be actuated and whereby

rotation of said bracket in the opposite direction causes only the other cable to be actuated, thereby ensuring that only one of said throttles is opened.

15. A jet propulsion watercraft as defined in claim 14 wherein turning of the manual steering control to the right actuates the throttle of the right propulsion unit and turning of the manual steering control to the left actuates the throttle of the left propulsion unit.
16. A jet propulsion watercraft as defined in claim 14 wherein turning of the manual steering control to the right actuates the throttle of the left propulsion unit and turning of the manual steering control to the left actuates the throttle of the right propulsion unit.
17. A motorboat comprising:
- (A) a hull;
  - (B) an outboard motor mounted to said hull for propelling said motorboat, said motor having a throttle for controlling the speed of rotation of the motor;
  - (C) a manual throttle control for controlling said throttle;
  - (D) a manual steering control for steering said motorboat; and
  - (E) a throttle actuator responsive to said manual steering control for causing said outboard motor to generate a propulsive force at least equal to the minimum propulsive force necessary to effectively steer said motorboat when said manual steering control is turned in either direction beyond a predetermined angular threshold, whereby to cause said motorboat to remain maneuverable independently of the manual throttle control setting.

18. A motorboat as defined in claim 17 wherein said throttle actuator is capable of controlling the speed of said motor.
19. A motorboat as defined in claim 18 wherein said throttle actuator is capable of controlling said throttle.
20. A motorboat as defined in claim 19 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.
21. A motorboat as defined in claim 20 wherein said throttle actuator comprises a lost-motion mechanism whereby said throttle is actuated only when said manual steering control is turned beyond a predetermined angular threshold.
22. A motorboat as defined in claim 21 wherein said manual steering control is mounted to a steering assembly, said steering assembly having a bracket for retaining said cable.

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23. A motorboat as defined in claim 22 wherein said steering assembly comprises mated gears for converting the rotation of said manual steering control into a rotation of said bracket.
24. A motorboat as defined in claim 23 further comprising a cable-receiving member fixed to said bracket, said cable-receiving member having a bore through which said cable can translate.
25. A motorboat as defined in claim 24 wherein said cable has an end-stopper of greater diameter than the diameter of said bore so that when said manual steering control is turned to the threshold, the end-stopper engages said cable receiving member, whereby further rotation of the manual steering control causes said cable to be displaced, thereby opening said throttle.
26. A motorboat as defined in claim 25 wherein said cable-receiving member is mounted eccentrically with respect to a vertical pivot axis of said bracket whereby rotation in either direction results in displacement of the cable-receiving member.
27. A motorboat as defined in claim 26 wherein said motorboat has a single motor.
28. A motorboat as defined in claim 26 wherein said motorboat has two motors.
29. A motorboat as defined in claim 28 wherein said throttle actuator has two cables.
30. A motorboat as defined in claim 29 wherein said throttle actuator has two cable receiving members symmetrically fixed to said bracket whereby rotation of said

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bracket in one direction causes only one cable to be actuated and whereby rotation of said bracket in the opposite direction causes only the other cable to be actuated, thereby ensuring that only one of said throttles is opened.

31. A motorboat as defined in claim 30 wherein turning of the manual steering control to the right actuates the throttle of the right motor and turning of the manual steering control to the left actuates the throttle of the left motor.
32. A motorboat as defined in claim 30 wherein turning of the manual steering control to the right actuates the throttle of the left motor and turning of the manual steering control to the left actuates the throttle of the right motor.
33. <sup>17</sup> A watercraft comprising:
- (A) a hull;
  - (B) a steerable propulsion unit driven by an internal combustion engine, said unit capable of generating thrust and capable of steering said watercraft by directing said thrust in a desired direction;
  - (C) a manual throttle control for controlling a throttle of said internal combustion engine;
  - (D) a manual steering control for steering said watercraft; and
  - (E) a throttle actuator responsive to said manual steering control for causing said steerable propulsion unit to generate a propulsive force at least equal to the minimum propulsive force necessary to effectively steer said watercraft when said manual steering control is turned in either direction beyond a

predetermined angular threshold, whereby to cause said watercraft to remain maneuverable independently of the manual throttle control setting.

34. <sup>18</sup> A watercraft as defined in claim <sup>17</sup> 33 wherein said throttle actuator is capable of controlling the speed of said engine.

35. <sup>19</sup> A watercraft as defined in claim <sup>18</sup> 34 wherein said throttle actuator is capable of controlling said throttle.

36. <sup>20</sup> A watercraft as defined in claim <sup>19</sup> 35 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.

37. <sup>21</sup> A watercraft as defined in claim <sup>20</sup> 36 wherein said throttle actuator comprises a lost-motion mechanism whereby said throttle is actuated only when said manual steering control is turned beyond a predetermined angular threshold.

38. <sup>22</sup> A watercraft as defined in claim <sup>21</sup> 37 wherein said manual steering control is mounted to a steering assembly, said steering assembly having a bracket for retaining said cable.

39. <sup>23</sup> A watercraft as defined in claim <sup>22</sup> 38 wherein said steering assembly comprises mated gears for converting the rotation of said manual steering control into a rotation of said bracket.



<sup>24</sup>  
40. A watercraft as defined in claim <sup>23</sup>29 further comprising a cable-receiving member fixed to said bracket, said cable-receiving member having a bore through which said cable can translate.

<sup>25</sup>  
41. A watercraft as defined in claim <sup>24</sup>40 wherein said cable has an end-stopper of greater diameter than the diameter of said bore so that when said manual steering control is turned to the threshold, the end-stopper engages said cable-receiving member, whereby further rotation of the manual steering control causes said cable to be displaced, thereby opening said throttle.

<sup>26</sup>  
42. A watercraft as defined in claim <sup>25</sup>41 wherein said cable-receiving member is mounted eccentrically with respect to a vertical pivot axis of said bracket whereby rotation in either direction results in displacement of the cable-receiving member.

<sup>27</sup>  
43. A watercraft as defined in claim <sup>26</sup>42 wherein said watercraft has a single steerable propulsion unit.

<sup>28</sup>  
44. A watercraft as defined in claim <sup>26</sup>42 wherein said watercraft has a pair of steerable propulsion units.

<sup>29</sup>  
45. A watercraft as defined in claim <sup>28</sup>44 wherein said throttle actuator has two cables.

<sup>30</sup>  
46. A watercraft as defined in claim <sup>29</sup>45 wherein said throttle actuator has two cable-receiving members symmetrically fixed to said bracket whereby rotation of said bracket in one direction causes only one cable to be actuated and whereby rotation of

said bracket in the opposite direction causes only the other cable to be actuated, thereby ensuring that only one of said throttles is opened.

47. <sup>31</sup>

<sup>30</sup>  
A watercraft as defined in claim ~~46~~ wherein turning of the manual steering control to the right actuates the throttle of the right propulsion unit and turning of the manual steering control to the left actuates the throttle of the left propulsion unit.

48. <sup>32</sup>

<sup>30</sup>  
A watercraft as defined in claim ~~46~~ wherein turning of the manual steering control to the right actuates the throttle of the left propulsion unit and turning of the manual steering control to the left actuates the throttle of right propulsion unit.

49. <sup>33</sup>

A jet propulsion watercraft comprising:

- (A) a hull;
- (B) a propulsion unit, comprising:
  - an internal combustion engine within said hull, said engine having a throttle for controlling the speed of rotation of said engine;
  - a manual throttle control for controlling the throttle of said internal combustion engine;
  - a jet propulsion water pump driven by said internal combustion engine, said jet propulsion water pump having a body, a water inlet for admitting water into said body, a water outlet at the opposite end of said body, an impeller for circulating water longitudinally through said body;
- (C) a manual steering control for steering said watercraft;
- (D) a steering nozzle coupled to said manual steering control and positioned immediately rearwardly of said body in registry with said water outlet, said

steering nozzle capable of being pivoted for controlling the direction of the jet of water produced by said propulsion unit and thereby steering said watercraft;

- (E) a throttle actuator responsive to a signal for causing the propulsion unit to generate a propulsive force at least equal to the minimum propulsive force necessary to effectively steer said watercraft for a given speed when said manual steering control is turned in either direction beyond a predetermined angular threshold, whereby to cause said watercraft to remain maneuverable independently of the manual throttle control setting;
- (F) a steer angle measuring device for generating a steer angle signal representative of the steer angle of said steering nozzle;
- (G) a speed measuring device for generating a speed signal representative of the speed of the watercraft;
- (H) a throttle actuator control circuit for generating an output signal for controlling said throttle actuator, said throttle actuator control circuit having:
  - a first input for receiving said steer angle signal;
  - a second input for receiving said speed signal; and
  - an output signal generator for generating an output signal in response to signals received at said first and second inputs, said output signal being applied to said throttle actuator for controlling said throttle actuator.

<sup>34</sup> 50. A jet propulsion watercraft as defined in claim <sup>33</sup> 49 wherein said throttle actuator is capable of controlling the speed of said engine.

<sup>35</sup> 51. A jet propulsion watercraft as defined in claim <sup>34</sup> 50 wherein said throttle actuator is capable of controlling said throttle.

36  
52. A jet propulsion watercraft as defined in claim 35 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.

37  
53. A jet propulsion watercraft as defined in claim 36 further comprising an RPM limiter controlled by said throttle actuator control circuit, said RPM limiter capable of controlling the spark plugs of said internal combustion engine so as to regulate said engine's speed.

38  
54. A jet propulsion watercraft as defined in claim 37 wherein said RPM limiter temporarily interrupts current to the spark plugs whereby intermittent ignition limits the engine speed.

39  
55. A jet propulsion watercraft as defined in claim 38 wherein said RPM limiter causes the spark plugs to arc non-optimally so as to diminish the engine's power stroke and thus to limit the RPM of the engine.

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56. A jet propulsion watercraft as defined in claim 39 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle actuator.

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57.

A jet propulsion watercraft as defined in claim 39 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle actuator.

58. A motorboat comprising:

- (A) a hull;
- (B) an outboard motor mounted to said hull for propelling said motorboat, said motor having a throttle for controlling the speed of rotation of the motor;
- (C) a manual throttle control for controlling said throttle;
- (D) a manual steering control for steering said motorboat;
- (E) a throttle actuator responsive to a signal for causing the outboard motor to generate a propulsive force at least equal to the minimum propulsive force necessary to effectively steer said motorboat for a given speed when said manual steering control is turned in either direction beyond a predetermined angular threshold, whereby to cause said motorboat to remain maneuverable independently of the manual throttle control setting;
- (F) a steer angle measuring device for generating a steer angle signal representative of the steer angle of said outboard motor;
- (G) a speed measuring device for generating a speed signal representative of the speed of the motorboat;
- (H) a throttle actuator control circuit generating an output signal for controlling said throttle actuator said throttle actuator control circuit having:

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- a first input for receiving said steer angle signal;
- a second input for receiving said speed signal; and
- an output signal generator for generating an output signal in response to signals received at said first and second input; said output signal being applied to said throttle actuator for controlling said throttle actuator.

59. A motorboat as defined in claim 58 wherein said throttle actuator is capable of controlling the speed of said engine.
60. A motorboat as defined in claim 59 wherein said throttle actuator is capable of controlling said throttle.
61. A motorboat as defined in claim 60 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.
62. A motorboat as defined in claim 61 further comprising an RPM limiter controlled by said throttle actuator control circuit, said RPM limiter capable of controlling the spark plugs of said internal combustion engine so as to regulate said engine's speed.
63. A motorboat as defined in claim 62 wherein said RPM limiter temporarily interrupts current to the spark plugs whereby intermittent ignition limits the engine speed.

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64. A motorboat as defined in claim 62 wherein said RPM limiter causes the spark plugs to arc non-optimally so as to diminish the engine's power stroke and thus to limit the RPM of the engine.
65. A motorboat as defined in claim 63 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle
66. A motorboat as defined in claim 64 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle actuator.

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67. A watercraft comprising:
- (A) a hull;
  - (B) a steerable propulsion unit driven by an internal combustion engine, said unit capable of generating thrust and capable of steering said watercraft by directing said thrust in a desired direction;
  - (C) a manual throttle control for controlling said internal combustion engine;
  - (D) a manual steering control for steering said watercraft;

- (E) a throttle actuator responsive to a signal for causing the steerable propulsion unit to generate a propulsive force at least equal to the minimum propulsive force necessary to effectively steer said watercraft for a given speed when said manual steering control is turned in either direction beyond a predetermined angular threshold, whereby to cause said watercraft to remain maneuverable independently of the manual throttle control setting;
- (F) a steer angle measuring device for generating a steer angle signal representative of the steer angle of said steerable propulsion unit;
- (G) a speed measuring device for generating a speed signal representative of the speed of the watercraft;
- (H) a throttle actuator control circuit for generating an output signal for controlling said throttle actuator; said throttle actuator control circuit having:
  - a first input for receiving said steer angle signal;
  - a second input for receiving said speed signal; and
  - an output signal generator for generating an output signal in response to signals received at said first and second input; said output signal being applied to said throttle actuator for controlling said throttle actuator.

<sup>43</sup> 68. A watercraft as defined in claim <sup>42</sup> 67 wherein said throttle actuator is capable of controlling the speed of said engine.

<sup>44</sup> 69. A watercraft as defined in claim <sup>43</sup> 68 wherein said throttle actuator is capable of controlling said throttle.



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70. A watercraft as defined in claim 69 wherein said throttle actuator comprises a cable responsive to said manual steering control and connected to said throttle for opening and closing said throttle.

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71. A watercraft as defined in claim 70 further comprising an RPM limiter controlled by said control circuit, said RPM limiter capable of controlling the spark plugs of said internal combustion engine so as to regulate said engine's speed.

47  
72. A watercraft as defined in claim 71 wherein said RPM limiter temporarily interrupts current to the spark plugs whereby intermittent ignition limits the engine speed.

48  
73. A watercraft as defined in claim 71 wherein said RPM limiter causes the spark plugs to arc non-optimally so as to diminish the engine's power stroke and thus to limit the RPM of the engine.

49  
74. A watercraft as defined in claim 72 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle actuator.

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75. A watercraft as defined in claim 73 further comprising a throttle measuring device for generating a throttle signal representative of the position of the throttle, said throttle actuator control circuit further comprising a third input for receiving said throttle

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signal; said output signal generator generating an output signal in response to signals received at said first, second and third inputs; said output signal being applied to said throttle actuator for controlling said throttle actuator.

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